MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2022/2023 (TERM ID 2210)

DSN5201– DATA COMMUNICATIONS & NETWORKING

14th FEBRUARY 2023
9.00 am – 11.00 am
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 3 pages.
2. Answer ALL questions.
3. Write your answers in the answer booklet provided.

Section A: True/False (Total: 10 marks)

Instruction: Answer ALL questions from this section in the Answer booklet Provided.

1. Duplex communication system allows both devices transmit and received simultaneously.
2. The major problem of star topology is the huge amount of cabling that makes installation and reconnection difficult.
3. The data link layer is responsible for the source-to-destination delivery of packets.
4. Transport layer of the OSI establishes, maintains, and synchronizes the interaction among communicating systems.
5. E-mail address is an example of port addresses.
6. Impulse noise is a spike (a signal with high energy in a very short period of time) that comes from power lines, lightning and so on.
7. In NRZ-L, a positive voltage means '0' bit, while a negative voltage means '1' bit.
8. In Differential Manchester encoding, the presence of transition at the beginning of bit time indicates bit '1'.
9. According to the Nyquist theorem, the sampling rate must be at least three times the highest frequency.
10. Quadrature amplitude modulation (QAM) is a combination of FSK and PSK so that a maximum contrast between each signal unit is achieved.

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Section B: Structured Question (Total: 50 Marks)

Instruction: Answer ALL questions from this section in the Answer booklet Provided.

QUESTION 1 [10 Marks]

a) Describe **ANY TWO** components of data communications system. (2 marks)

b) Encode bit stream **01010111001** with the encoding below: (8 marks)

i. Manchester encoding
ii. NRZ-L
iii. AMI
iv. Differential Manchester

QUESTION 2 [10 Marks]

a) Which characteristics of an analog signal are changed to represent the digital signal in each of the following digital-to-analog conversion? (4 marks)

i. ASK
ii. FSK
iii. PSK
iv. QAM

b) Ten sources, six with a bit rate of 200 kbps and four with a bit rate of 400 kbps are to be combined using multilevel TDM with no synchronizing bits. Answer the following questions about the final stage of the multiplexing:

i. What is the size of a frame in bits? (1 mark)
ii. What is the frame rate? (1 mark)
iii. What is the duration of a frame? (2 marks)
iv. What is the data rate? (2 marks)

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QUESTION 3 [10 Marks]

a) Explain the purposed of the cladding in an optical fiber. (1 mark)

b) Given the codeword 110010111 and the divisor 1100, use the CRC method to determine whether the codeword is free for error. (5 Marks)

c) Define the type of address (unicast, multicast or broadcast) for the following Ethernet address: (4 marks)

i. 01:00:5E:54:18:09
ii. 2C:1D:30:00:5A:11

QUESTION 4 [10 marks]

a) Construct the Hamming code for the bit sequence 110011 and determine the complete bits that will be sent by the sender. After this, assuming that the corresponding code is transmitted successfully, prove that the bits sent has no error occurred at receiver.

(10 Marks)

QUESTION 5 [10 marks]

a) Define channelization and list **THREE** protocols in this category. (4 marks)

b) Explain THREE comparisons between connectionless oriented and connection-oriented services in transport layer protocol. (6 marks)

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